Cargo Handling Equipment Idling Emissions

September 16, 2009
Sacramento

California Environmental Protection Agency

Air Resources Board

Why cargo handling equipment idling emissions?

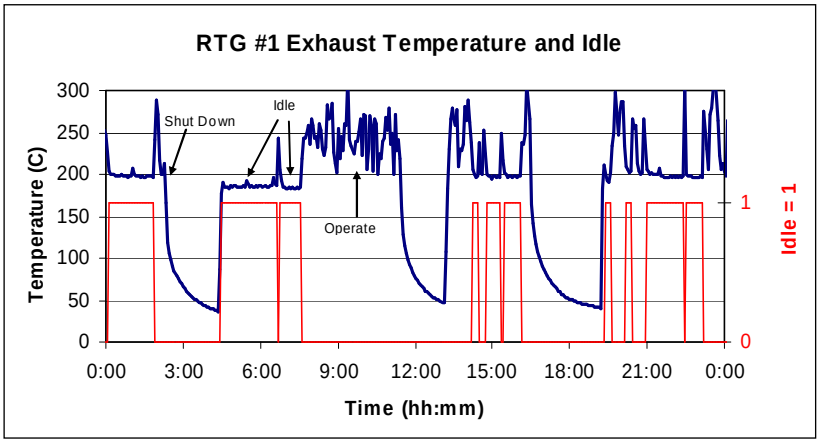
"ARB would investigate and potentially develop a new measure to restrict unnecessary idling, which would reduce fuel consumption and associated greenhouse gases, criteria pollutants, and toxic air contaminants."

Reference: Climate Change Scoping Plan
Volume 1, Appendix C, page C-69, ***Cargo Handling Equipment***

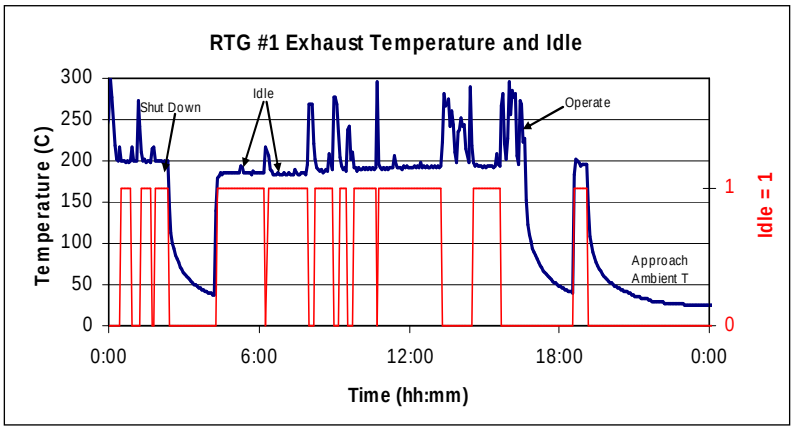
Cargo Handling Equipment Idling Data

- Gathered exhaust temperature data for cargo handling equipment at three ports
  - Port of Oakland
  - Port of Los Angeles
  - Port of Long Beach
- Port equipment data logged
  - 3 RTG cranes
  - 6 Top picks
  - 2 Side picks
- Measured exhaust temperatures for periods of 8 to 30 days for the different pieces of equipment
- Identified idle times of 10 minutes or more

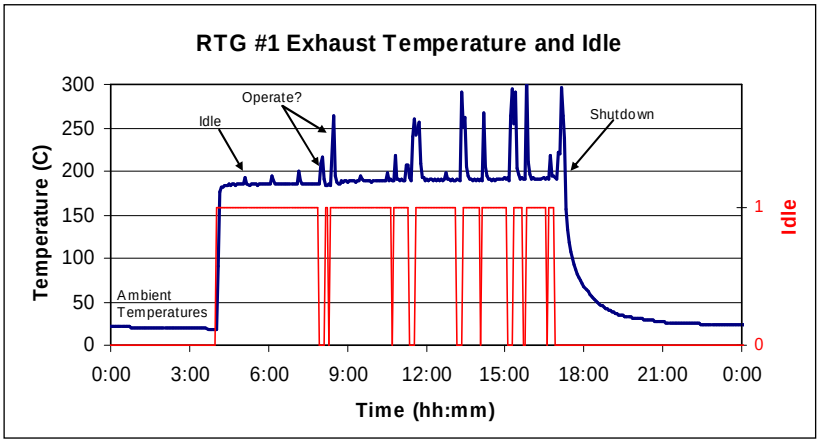
Exhaust Temperature Data Used to Evaluate Idle Times (5/24/06)



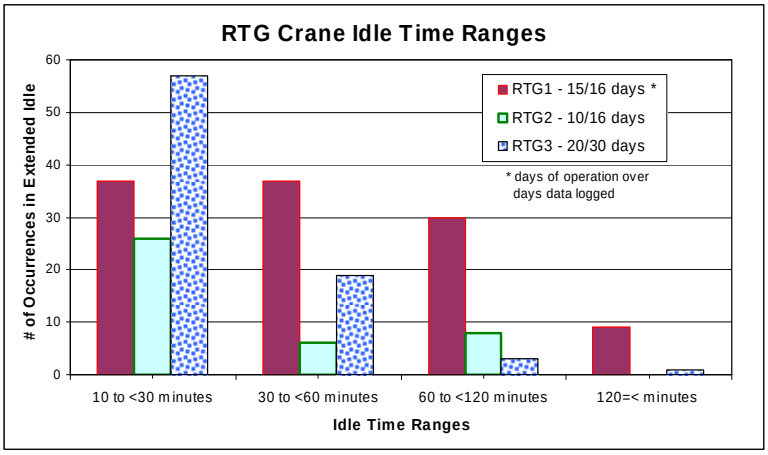
Exhaust Temperature Data Used to Evaluate Idle Times (5/19/06)



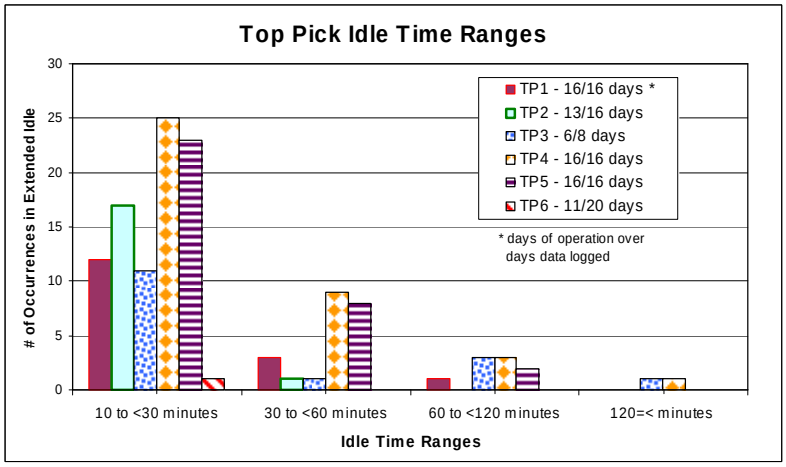
Exhaust Temperature Data Used to Evaluate Idle Times (5/26/06)



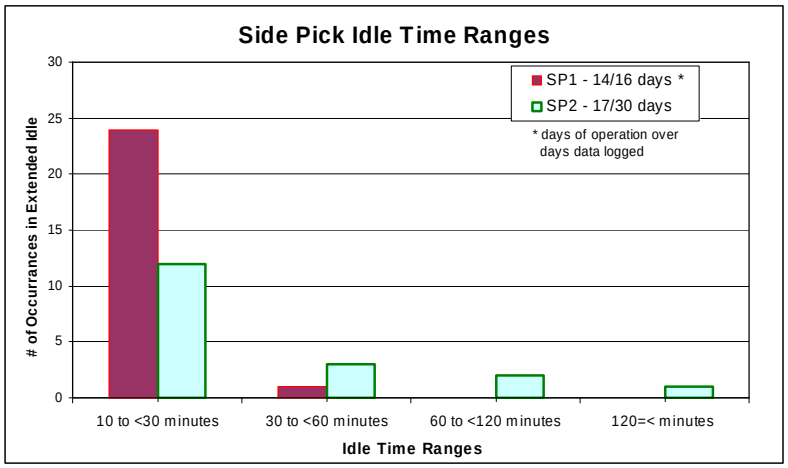
Data from All 3 RTG Cranes Indicate Idle Times Over 1 hour



4 out of 6 Top Picks Demonstrated Idle Times Over 1 Hour



1 of 2 Side Picks Demonstrated Some Idle Times Over 1 Hour



RTG Cranes Idle Longer and More Often than Top and Side Picks

Average Idle Times per Equipment Type
(Idle times over 10 minutes)

Parameter	RTG	Top Pick	Side Pick
Average Length of Idle (hh:mm) =	0:39	0:25	0:25
Average # of Idles/ Day of Operation=	5.2	1.6	1.4
Average Time in Idle/ Day of Operation (hh:mm)	3:40	0:44	0:32
Average Amount of Time in Operation/ Day of Operation (hh:mm)	9:41	6:09	3:53
Average Annual Idle (hours)	1132	254	136
Average Annual Use (hours)*	2851	2002	1041
% Idle Time/ Operation Time	34%	11%	14%
Average # Days Operated/ Year	265	309	246

*Note: Values are averages and may not be consistent with multiplication of other averages.

Single RTG Crane Extended Idling Generates Over 1 Metric Tonne of CO_2 per Year

Average Idle Impacts per Equipment Type (Idle times over 10 minutes)			
Idle Emissions, Fuel, and Cost	RTG	Top Pick	Side Pick
CO_2 lb/year	2,600	270	110
PM lb/year	1.4	0.14	0.06
NOx lb/year	16	1.7	0.7
Diesel gal/year	120	12	5
Fuel cost/year	$ 350	$ 37	$ 14

RTG Crane Extended Idling Estimated to Contribute About 285 Metric Tonnes of CO_2 Annually Statewide

Extrapolated Idle Impacts for the 2007 Statewide Port Inventory by Equipment Type (Idle times over 10 minutes)			
Idling Emissions, Fuel, and Cost	RTG	Top Pick	Side Pick
Estimated Pieces of Equipment from 2007 Statewide Port Inventory	240	420	40
CO_2 lb/year	630,000	112,000	4,300
PM lb/year	330	60	2
NOx lb/year	3,900	700	26
Diesel gal/year	29,000	5,100	200
Fuel cost/year	$ 83,000	$ 15,000	$ 600

Estimate Cargo Handling Equipment Idling Reduction Benefits

Eliminating 10 minute or longer Idle times for all RTG cranes, top picks, and side picks at California ports:

- reduce greenhouse gases by ~340 metric tonnes annually
- reduce 0.2 tons of PM and 2.3 tons of NOx emissions annually
- save ~34,000 gallons of fuel per year
- save ~$100,000 per year in fuel costs

Additional Data Needed

- Current estimates based on limited Ports data
  - 3 equipment types
  - 11 pieces of equipment
  - Short data gathering time frame
- Need data on a more representative sample (5-10% of equipment and operating time) for:
  - RTG cranes
  - Top picks
  - Yard trucks
- Need data for all equipment types at intermodal rail yards

Cargo Handling Equipment Idling Reduction

- ARB staff are looking for proposals from the port terminal and intermodal rail yard operators that may include:
  - Identification of operations that lead to excessive idling
  - Suggesting procedural changes to reduce idle times
  - Setting firm limits on allowable idle times

Cargo Handling Equipment Idling Reduction

- Possible Measures:
  - Require data logging and reporting of idle time for a portion of the fleet
  - Set and enforce idle time limits

Cargo Handling Equipment Alternatives for GHG Reductions

- Hybrid system on an RTG crane to store the container drop energy for use in assisting the container lift
- RTG crane retrofit to all electric system
- Hybrid yard trucks

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